

[94e-14-R18-MobEnh] - Version 0.0.4

RAN

3GPP TSG RAN Meeting #94-e

RP-21xxxx

Electronic Meeting, December 6th – 17th, 2021

Source: MediaTek

Title: Moderator's summary of discussion for [94e-14-R18-MobEnh]

Agenda item: 8A.2

Document for: Report

1 Introduction

As per guidance from the chairman, this discussion will take place during the first week of RAN#94-e. The discussion will take place on the revised draft WID uploaded to the Drafts Folder in sub-folder [94e-14-R18-MobEnh], showing changed compared to RP-212710 (October outcome).

Please note the deadlines for commenting for Initial, Intermediate, Final phase, as provided by the chairman in the "Draft RAN#94-e_Timeplan".

Please also take note of the company contributions submitted to the meeting on this topic, listed below.

Table 1:

<u>RP-212950</u>	Mobility related CA/DC enhancements in Release 18	Nokia, Nokia Shanghai Bell
<u>RP-213009</u>	Discussion on the scope of Rel-18 Further NR mobility enhancements	Intel Corporation
<u>RP-213276</u>	Views on NR further mobility enhancement	vivo
<u>RP-213221</u>	Comments on Rel-18 mobility draft WID	Huawei, HiSilicon
<u>RP-213357</u>	L1/L2-based Mobility Enhancements in Rel-18	MediaTek Inc.
<u>RP-213374</u>	Views on Mobility Enhancement	Apple

<u>RP-213375</u>	WID modification for Rel-18 Mo- bility Enhancements	Apple
<u>RP-213463</u>	Discussion on Rel-18 Mobility en- hancement	ZTE, Sanechips

2 Initial Phase

2.1 Justification section

I made some minor wording updates to the Justification section, so please indicate if these are helpful.

Please also comment on any areas where you believe that the Justification is not aligned with the “existing” listed Objectives only. Please do NOT propose added justification for objectives that you would like to see but are not yet covered, as this will be handled in a later phase of the discussion.

Feedback Form 1: Justification comments

1 – Apple Computer Trading Co. Ltd

Agree that the justification description is aligned with the existing listed objective in general. But it needs to be further updated when the objective part is stable. In addition, the WI should also include the RAN4 work since the new cell change scheme and new measurement needs the new requirements defined in RAN4.

2 – MediaTek Inc.

Yes, the updated wording is good for us.

3 – Intel Corporation (UK) Ltd

In general, the changes from Moderator look good. Just small clarifications:

For MR-DC with selective activation of cell groups, the benefit is to reduce the signalling overhead and interruption time for SCG change instead of CPC/CPAC. See below changes:

This results in a reduction of the signalling overhead and interrupting time for SCG changeCPC/CPAC.

4 – HuaWei Technologies Co.

Regarding the justification part of CHO and MR-DC, we understand the objective “3. To specify CHO including target MCG and target SCG if it cannot be completed in Rel-17 [RAN3, RAN2]” can be completed in Rel-17, thus the corresponding justification can be updated accordingly. But we are okay to wait for the conclusion of this email discussion. Other than that, we are in general fine with the revised justifications.

5 – ZTE Corporation

We can keep current justification as it is and do the update based on the discussion on objectives (if necessary).

<p>6 – New H3C Technologies Co.</p> <p>We are fine with current justification with updated wording.</p>
<p>7 – LG Electronics France</p> <p>Fine</p>
<p>8 – China Mobile Com. Corporation</p> <p>We are fine with the current version.</p>
<p>9 – Ericsson LM</p> <p>Fine in general. Polishing needed once the scope of the WI is settled.</p>
<p>10 – Guangdong OPPO Mobile Telecom.</p> <p>We are fine with the modified justification.</p>
<p>11 – Nokia Corporation</p> <p>Generally the justification section looks ok. Small clarifications could still be done but all the justification updates can be done once the objectives are agreed.</p>
<p>12 – InterDigital France R&D</p> <p>We are fine with the modified justification.</p>
<p>13 – TURKCELL</p> <p>We're fine with the modified version.</p>
<p>14 – VODAFONE Group Plc</p> <p>We are fine with the modified justification (v00 reviewed).</p>

2.2 Objective 1: L1/2 mobility-related

The proposed objective 1 is the following below:

To specify mechanism and procedures of L1/L2 based inter-cell mobility for mobility latency reduction:

- *Configuration and maintenance for multiple candidate cells to allow fast application of configurations for candidate cells [RAN2, RAN3]*
- *Dynamic switch mechanism among candidate serving cells (including SpCell and SCell) for the potential applicable scenarios based on L1/L2 signalling [RAN2, RAN1]*
- *L1 enhancements, including inter-cell beam management, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]*
 - *Note: early RAN2 involvement is necessary, including the possibility of further clarifying the interaction between this bullet with the previous bullet.*

- CU-DU interface signaling to support L1/L2 mobility, if needed [RAN3]

Note 1: FR2 specific enhancements are not precluded, if any.

Note 2: The procedure of L1/L2 based inter-cell mobility are applicable to the following scenarios:

- Standalone, CA and NR-DC case with serving cell change within one CG
- Intra-DU case and intra-CU inter-DU case (applicable for Standalone and CA; no new RAN interfaces are expected)
- Both intra-frequency and inter-frequency
- Both FR1 and FR2

2.2.1 All sub-objectives "except" L1 enhancements sub-objective

Please indicate, using the feedback form below, if you have any critical comments on the above RAN2 and RAN3-led components of these objectives and the points in Note 1 and Note 2. Note that these aspects have only received minor corrective updates by the RAN Chairman since the October email discussion, and no input documents, so I hope companies agree that they can be considered stable.

Feedback Form 2: Comments on L1/2 mobility "except" L1 enhancements

<p>1 – Apple Computer Trading Co. Ltd</p> <p>Agree that the justification description is aligned with the existing listed objective in general. But it needs to be further updated when the objective part is stable. In addition, the WI should also include the RAN4 work since the new cell change scheme and new measurement needs the new requirements defined in RAN4.</p>
<p>2 – MediaTek Inc.</p> <p>Yes, we think this can be considered stable.</p>
<p>3 – Intel Corporation (UK) Ltd</p> <p>Current scope Looks ok.</p>
<p>4 – Samsung Research America</p> <p>For CU-DU interface signaling, we see a clear signaling enhancement over F1. Thus, we would like to suggest to remove the term "if needed" in the following objective:</p> <p style="margin-left: 20px;">- CU-DU interface signaling to support L1/L2 mobility, if needed [RAN3]</p>
<p>5 – HuaWei Technologies Co.</p> <p>We are fine with the current objectives of L1/L2 mobility from the moderator.</p>

<p>6 – ZTE Corporation</p> <p>We are fine with current objective in general, but we think there may be some changes needed depending on the outcome of the discussion for Objective 2 below.</p>
<p>7 – Guangdong OPPO Mobile Telecom.</p> <p>We think the current objectives are clear and prefer to keep it as it is.</p>
<p>8 – New H3C Technologies Co.</p> <p>we are fine with current objective</p>
<p>9 – LG Electronics France</p> <p>Fine</p>
<p>10 – China Unicom</p> <p>We are fine with the L1/L2 mobility objectives summarized by the moderator.</p>
<p>11 – Verizon UK Ltd</p> <p>Agree with the moderator’s summary.</p>
<p>12 – China Mobile Com. Corporation</p> <p>Agree.</p>
<p>13 – Ericsson LM</p> <p>Fine</p>
<p>14 – Nokia Corporation</p> <p>We are fine with the description of this objective</p>
<p>15 – InterDigital France R&D</p> <p>We are fine with this current objective.</p>
<p>16 – HuaWei Technologies Co.</p> <p>RAN4 Chair: To Apple, no matter whether it is an explicit indication that RAN4 should be involved for a certain objective, RAN4 will do the normative work to specify the requirements based on RAN1/2 design to ensure the good performance of new techniques in the practical network. If the objective explicitly involves RAN4, it means the design needs the special input from RAN4. So it depends on expertise consensus whether the special input from RAN4 is needed or not.</p>
<p>17 – HuaWei Technologies Co.</p> <p>RAN4 Chair: in section 4.2 of draft WID, the core part is placed in the wrong place. It is better to have a dedicated objective to make clear whether and what RAN4 requirement (RF core, RRM core, RRM perf) are needed. For example, RAN4 RF core requirement is needed for objective #xxx, RAN4 RRM core requirement is needed for objective #yy.</p>

18 – TURKCELL

It looks stable. We're fine with the objective.

2.2.2 L1 enhancements sub-objective

I would like to make the L1 enhancements sub-objective (copied below) clearer if possible in terms of what is intended to be addressed, in order to avoid parallel discussions in RAN1/2 on improving the same protocol stack functions.

- *L1 enhancements, including inter-cell beam management, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]*
 - *Note: early RAN2 involvement is necessary, including the possibility of further clarifying the interaction between this bullet with the previous bullet.*

Contributions [RP-213276](#) and [RP-213357](#) propose to address aspects with this sub-objective. In particular, please address the following points:

- Which L1 enhancements do companies propose for this sub-objective and what is the justification? Are they optimizing existing L1 functions or replacing a L2/3 function? Can we remove "including"?
- Views appreciated on whether the TA management for the non-synchronized scenario is a L1 enhancement, or whether higher layer solutions are also applicable (separate item). Please provide technical rationale for your preference.

Feedback Form 3: L1 enhancements sub-objective comments

1 – vivo Mobile Communication Co.

1. Our understanding on "L1 enhancement" is what mentioned after "including", e.g. inter-cell beam management, L1 measurement/reporting, etc. Thus, we think we should NOT remove "including". Whether the L1 functions could replace L2/3 functions could be further discussed during WI phase in WG.

2. We think non-synchronized scenario are not just related to TA handling, but also related to measurement and measurement report, etc. We think measurement and corresponding report for both synchronized and non-synchronized scenarios should be considered for L1/L2 based inter-cell mobility. There is no reason to exclude any of them for now. It is better to indicate non-synchronized scenario as separately. So we suggest to update it as:

L1 enhancements for both synchronized and non-synchronized scenarios, including inter-cell beam management, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]

2 – DOCOMO Communications Lab.

Please find NTT Docomo comments in bold.

Which L1 enhancements do companies propose for this sub-objective and what is the justification? Are they optimizing existing L1 functions or replacing a L2/3 function? Can we remove "including"?

==> We're okay with current L1 enhancements in the WID. We believe we're optimizing existing L1

functions, which can be applied on top of existing L2/L3 functions.

==> Keeping ‘including’ would be better. Otherwise, it is not clear what the ‘L1 enhancements’ refer to without ‘including’.

Views appreciated on whether the TA management for the non-synchronized scenario is a L1 enhancement, or whether higher layer solutions are also applicable (separate item). Please provide technical rationale for your preference.

==> TA enhancement is important for un-sync. scenario. Whether TA management is a L1 enhancement or higher layer enhancement depends on the detailed design. For example, TAG like enhancement involves higher layer enhancement, while TA adjustment is more like L1 enhancement. For this TA enhancement for un-sync. scenario, we’re open to list it as a separate item to consider potential different levels of enhancement.

3 – Apple Computer Trading Co. Ltd

1. On whether or not keep ‘including’ in the first bullet, our preference is to keep it as in current draft WID to make the L1 enhancement direction/areas as concrete as possible.

2. On the TA management, we think it depends on the exact designs, which should be part of discussion in normative WI phase. This bullet should be formulated to open for both L1-based (e.g. inter-cell TA adjustment) and higher layers (e.g. RACH-skip during the cell change)solution as well. The need to separate TA is not very clear since it would involve both RAN1 and RAN2.

4 – MediaTek Inc.

MODERATOR CLARIFICATION: The term ”Including” suggests that other areas not mentioned are not necessarily excluded. By removing ”including”, my intention was not to remove detail, but instead to make it clear that it only includes the areas that we state.

5 – Lenovo (Beijing) Ltd

We suggest to explicitly indicate that both sync and non-sync cases are included.

6 – KDDI Corporation

1. we are not sure whether we can list up all L1 features, so we prefer to keep it as it is.

2. In our understanding, TA enhancement can be used for both sync and unsync case, so we prefer to have sentences to which can cover both cases.

7 – MediaTek Inc.

- We think that the “beam management” and “beam indication” mentioned in this sub-bullet overlap with “dynamic switch” in previous sub-bullet. These are likely to be enhancements for Rel-17 inter-cell beam management (i.e., ICBM with serving cell change), and for UE-initiated beam failure recovery/beam selection. While RAN1 involvement is needed, we should avoid parallel discussions in RAN1 and RAN2. Our suggestion is that the work starts from RAN2 since inter-cell mobility is the focus, and RAN2 triggers corresponding RAN1 discussions.

- L1 measurement and reporting may be consider as L1 enhancements and started directly in RAN1, considering e.g., CSI-RS (for mobility) as measurement resources in L1/L2-based inter-cell mobility

- TA management for non-synchronized scenario should also start from RAN2.

8 – SHARP Corporation

We think that the L1 enhancements should be discussed assuming "including". The roll of L1 and L2/L3 function should be discussed during the work. About the TA management, this also should be discussed during the work.

9 – Intel Corporation (UK) Ltd

We believe current scope captured potential RAN1 enhancements well although we may identify other impacts during the discussion. Regarding the TA management for non-synchronized scenario, the required discussion/work is whether existing TA management is sufficient for non-synchronized scenario and what enhancement should be made for TA management. Of course, it is a kind of TA management is cross layer feature between PHY and MAC. In addition, some RRC parameter will be required. We do not see the need to discuss whether it is L1 or high layer TA management since anyway both RAN1 and RAN2 are listed as responsible WGs.

10 – China Telecommunications

1. We prefer to keep the "including" as it can give the guidance on what we should focus on when designing the L1 enhancements functions, as for the L1 enhancements is refer to optimize existing L1 functions or replace L2/3 function, it depends on the detailed design during the normative WI phase.
2. We think both L1 and high layer solutions for TA management should be studied during the WI phase, so we are open to list TA management as a separate item.

11 – CATT

1. we think the part after 'including' should be kept as it gives important info as to what is going to be enhanced.
2. we agree TA management impacts both ran1 and ran2. no strong view regarding whether to use a separate bullet or not, as long as the impacted WGs are listed.

12 – Samsung Research America

Regarding L1 enhancements, we are fine to keep the enhancements listed: inter-cell beam management which includes L1 measurement and reporting, and beam indication.

Furthermore, we would like to add "power control handling" because it's a fundamental L1 functionality.

TA management for non-synchronized scenarios can be kept as part of the L1 enhancement. This doesn't preclude L2 enhancements on top of the L1 enhancements because RAN2 is already listed a secondary WG.

Hence, we suggest the following update:

– L1 enhancements, ~~including~~ for inter-cell beam management, including L1 measurement and reporting, beam

*indication, **power control handling**, and for non-synchronized scenario to handle TA management [RAN1, RAN2]*

13 – HuaWei Technologies Co.

- 1) We think the current L1 objective is clear enough. Rel-18 L1/L2 mobility is targeting at "dynamic serving cell change". Thus L1 measurement, reporting and beam indication should be designed to facilitate such

“dynamic serving cell change”, which is quite different from R17 where the serving cell remains unchanged. In addition, the RAN2-led objectives are mainly to address the procedure of “dynamic serving cell change” for various applicable scenarios, which is based on “L1 enhancements” from RAN1, with which the work load split is sufficiently clear. Also we expect RAN1 work to start one quarter later after RAN2 initial discussions, and thus we don’t see a risk of parallel discussions in WGs.

2) We think RAN1 has better expertise on how to obtain TA for non-synchronized cases, and the detailed approaches can be discussed in the normative phase. As RAN2 has been included in impacted WGs we don’t see a need to have a separate RAN2 item on TA management.

14 – ZTE Corporation

We are fine with the current objective.

15 – New H3C Technologies Co.

We are supportive for the current objective

16 – LG Electronics France

The main enhancements of this objective are L1-driven but the enhancements are not entirely isolated to L1 enhancements but possibly include some joint enhancements to L2/L3(RRC) as well. For instance, inter-cell BM and L1 measurement and reporting require signaling support in L2/L3 at least. In addition, RLM enhancements, which were briefly discussed during R17 feMIMO, can be considered to better support feMIMO and/or feMIMO capability-based mobility in R18, which require a joint discussion in RAN1 and RAN2 (and possibly RAN4). Given the considerations, it seems better to modify the objective as follows:

- *L1/L2 enhancements, including but not limited to inter-cell beam management, L1 measurement and reporting, beam indication, radio link monitoring, and for non-synchronized scenario to handle TA management, if beneficial[RAN1, RAN2]*

Regarding TA, we are not sure if there is any problem with the current wording, because extra TA management is not necessary in synchronized scenarios but required only in asynchronous scenarios. BTW, the wording “sync” and “async” seems to lack a strict definition.

17 – Verizon UK Ltd

In general, we are fine with the proposal. For TA enhancement, as an operator we don’t have a strong view on RAN1 or RAN2, separated listing or not, as long as non-synchronized scenarios are covered along with synchronized scenarios.

18 – China Mobile Com. Corporation

For Q1, it is clearer to keep the “including” since following details explain what we found to study so far. But we are open to have modified scope of L1 enhancement during the discussion. As for the potential function overlap between L1 and L2/L3, this should be discussed during WI phase.

For Q2, we prefer to explicitly point out that the scenario includes both sync and non-sync. Without detailed discussion, we don’t think the TA management need to be limited to L1 enhancement. TA management can be listed as a separate item.

19 – Ericsson LM

On the note on "early RAN2 involvement": Perhaps clearer would be to say that RAN1 should use / await guidance from RAN2 for these functions.

20 – Nokia Corporation

- *Which L1 enhancements do companies propose for this sub-objective and what is the justification? Are they optimizing existing L1 functions or replacing a L2/3 function? Can we remove "including"?*

L1 inter-cell mobility requires enhancements for L1 beam measurement reporting to capture the measurements of neighbouring cells and L1 signalling message instructing the cell change. These enhancements are expected to be carried out by extending the existing L1 functions.

- *Views appreciated on whether the TA management for the non-synchronized scenario is a L1 enhancement, or whether higher layer solutions are also applicable (separate item). Please provide technical rationale for your preference.*

As for the TA management for the non-synchronized scenario, there are different options:

·Option 1: The UE needs to perform random access to the target cell to acquire the timing advance. In this case, the random access is not enhanced which is similar to L3 mobility procedures (baseline handover, conditional handover, etc.).

·Option 2: The UE acquires the timing advance for the target cell before the cell change is triggered. In this case, the UE can switch to the target cell in a RACH-less manner.

If TA management of target cell to be achieved using option 2, it will require some L1 enhancements. Thus, both L1 enhancements and higher layer solutions should be considered to evaluate all the possible options.

21 – China Unicom

We agree with the above clarification that the 'L1 enhancement' means what the objectives shown after 'including'. So "including" should not be removed to avoid any confusion on the objectives. For TA management, we think it can be used for both sync and non-sync case, and the detailed design can be left for discussion during WI phase.

22 – InterDigital France R&D

We think the current bullet is fine. We can leave it upto the WI itself to determine which L1 enhancements are needed. Regarding TA management, we think this will involve both L1 and L2, so we should not further identify whether it is in the scope of only RAN1 or RAN2 at this stage.

23 – ZTE Corporation

Some further views from RAN1 perspective:

The UE initialized reporting, and dynamic activation for L1 based neighbouring cell measurement, and unified TCI framework further applying to Scenario-2 should be considered. Of course, some pre-configuration for neighbouring cell (e.g., DL/UL channel/RS resource besides for TCI state associated with a PCI different from serving cell) and dynamic activation should be considered based on L2/L3 function. We are open to remove or have 'including ...'.

Then, we think that TA management for non-synchronized scenario also involves L1 enhancement. As we mentioned before, the TCI based TA indication and PDCCH order RACH transmission for neighbouring cell both should be considered. Of course, the pre-configuration/association between TCI state and TA for

TCI based TA indication, and between RACH transmission and SSB/CSI-RS for PDCCH order RACH transmission should be considered well with the assistance of higher layer signaling.

24 – TURKCELL

We're generally fine with the objective.

25 – MediaTek Inc.

In view of the comments, we think that the dynamic cell switch procedure (based on e.g., inter-cell BM) should be started in RAN2. L1 enhancements may include L1 measurement reporting and potential L1 signalling instructing cell change.

2.3 Objective 2: NR-DC related L3 enhancements

The proposed objective is:

To specify mechanism and procedures of NR-DC with selective activation of the cell groups via L3 enhancements:

- *To allow subsequent CPC/CPAC after changing SCG without reconfiguration and re-initiation of CPC/CPAC [RAN2, RAN3, RAN4]*
- *TBD: whether Rel-17 CPC/CPAC mechanism is used as the baseline*

Please provide comments in particular on:

- Whether you believe that inclusion of MCG and NR-standalone is justified and why. Also please give your view on level of additional workload vs SCG, and relation to Objective 1. [RP-213009](#) argues for such an extension.
- Your view and rationale on the remaining "TBD" point, including whether you believe enabling via a network command is justified and why ([RP-213009](#) and [RP213221](#) make different arguments), and usage of Objective 1 functionality for such a network command ([RP-213463](#)).

See contributions [RP-213009](#), [RP-213221](#), [RP-213463](#) for Objective 2.

Feedback Form 4: Objective 2: NR-DC L3 enhancements comments

1 – DOCOMO Communications Lab.

As for potential inclusion of MCG, we are wondering what the potential use-case is, considering that supporting MCG would lead to additional complexity.

We suppose the main target deployment scenario is FR2 MCG, potentially in a predictable mobility - we can think of an AGV moving along a certain path as an example. We are not sure the case only justifies the impact, and happy to discuss other promising use cases.

Regarding TBD, our quick assessment is that we can re-use CPC/CPAC if MCG is not included, and not otherwise.

2 – Apple Computer Trading Co. Ltd

1. We support to cover the MCG change in this objective. The MCG is also possible to be configured and deployed on FR2 and the MCG change will happen frequently, therefore, the similar SCG enhancement is also needed for the MCG change case. To avoid the additional work load, we agree to limit the enhancement in NR SA and NR-DC.

2. For TBD, we think both the condition based (i.e. CPC/CPAC based enhancement) or NW command triggered cell/SCG change procedures can work well. In our understanding, for the NW command triggered solution, the framework is same as L1/L2 mobility (in objective 1), but the cell change command is the L3 signaling instead of L1/L2 command. So we are fine to study both solutions in the normative WI phase.

3 – Lenovo (Beijing) Ltd

The motivation of this Objective is mainly to support the switch between multiple SCGs without changing MCG, especially when MCG uses FR1 and SCG(s) uses FR2. Inclusion of MCG and NR-standalone scenario shall be discussed separately.

It is ok to take Rel17 intra-SN inter-SN CPC as baseline. Regarding if NW can indicate “selective as activation of cell groups” via NW command, it may need further assessment (e.g. as part of WI) under a general principle that it shall provide better performance (w.r.t., latency, complex) compared to the legacy L3 based SCG reconfiguration/switch.

4 – KDDI Corporation

First we should clarify what should be done to support MCG case.

we are not so motivated to add the objective considering the limited time units.

If we identify what should be done to support MCG case, and the relevant task seems to be small and acceptable to everyone, we are ok.

5 – MediaTek Inc.

- **Inclusion of MCG and NR-standalone:** This is like keeping CHO candidates after HO/CHO. We have discussed this idea in Rel-16 but it was eventually not adopted due to concern about RRC responsibility (requiring UE to keep RRC configurations of previous serving cell). For SCG, the candidates should be in the coverage of the same PCell, and thus selective activation makes more sense. Therefore, we prefer not to include MCG and NR standalone scenarios.
- **Network command:** Technically speaking, selective activation can be triggered by network command, and this can be based on L1/L2 signaling since candidate cell RRC configurations have been provided to UE in advance. Then we think selective activation with network command should be considered as a part of Objective 1. In other words, L1/L2 inter-cell mobility may support not only PCell change but also PSCell change. And in Objective 2, we consider only L3-based procedures (enhancement of CPAC mechanism).

6 – Intel Corporation (UK) Ltd

As proponent, our thinking is:

The motivations to support MCG and NR SA are:

1 As with CPC/CPAC, so far CHO configuration will be released after successful HO. And therefore the UE cannot perform subsequent CHO unless the network configures it again to the UE after the HO. Therefore

the interruption time and signalling overhead are impacted for MCG change if we use CHO as specified today;

2 the solution to support MR-DC for selective activation of Cell groups for SCG is quite similar to the solution that would be needed for MCG. We can support both of them in the same release with only little additional efforts;

Regarding the network command, we see two benefits for it:

1 Can address load balancing scenario which cannot be supported by execution condition;

2 Leaves more flexibility to the network. The network may trigger the switching taking account of other reasons, and can trigger the switching faster, and the network is aware of when the UE will move to the target that is more predictable than execution condition based switching.

7 – SHARP Corporation

We think the main target of the selective activation is for SCG, so the discussion for SCG case should be prioritized due to the limited TU.

8 – vivo Mobile Communication Co.

1. Regarding inclusion of MCG and NR-standalone: Our initial assessment on the impact is network provide configuration for multiple candidate MCG, while selective actiation based on L3 enhancements, which could increase the performance of reliability and latency reduction. Similar mechanism has been discussed in Rel-16 Mobility, and not too much complexity will be introduced. We are fine to include it in the objective.

2. Regarding ”TBD”, we could take CPAC mechanism as the starting point for selective activation of SCG. But network indication through L3 signaling should not be excluded by now. It could be further discussed in WG if time is allowed.

9 – China Telecommunications

1. We think we should first discuss the SCG change scenarios and then expand the mechanism to the MCG change cases if time allows.

2. We think both CPAC based enhancement (UE triggered) and NW triggered mechanism should be supported for this objective, the detailed solutions can be discussed in the WI phase.

10 – CATT

First of all we prefer to go for a simple and manageable objective. Therefore we believe objective 2 should not have interaction with L1/L2 mobility, meaning that it is purely L3 procedure. Furthermore, again for the sake of simplicity we believe it is important to use Rel-17 CPAC as baseline, which means we will need to focus on SCG case.

11 – Samsung Research America

– We see a benefit on inclusion of MCG an NR SA case. It would be useful to minimize Uu signaling overhead, especially with subway/train use cases.

– Since it is not assumed that the additional workload is critical with network command, we have no negative view on enabling via network command.

– For the selective activation of the cell groups, we would like to prioritize L3 enhancements over L1 enhancements.

12 – HuaWei Technologies Co.

1) No, we don't think MCG and NR-standalone needs to be added. For MR-DC cases, the frequent MCG change is not justified as we understand normally MCG should be deployed at FR1 band with better coverage. In addition, the inclusion of MCG and NR-standalone cases would significantly increase the work load for considering more cases, e.g. MN change with and/or without SCG change.

2) As we explained in RP-213221, we think more workload is seen for RAN2 and RAN3: in the solution of SCG change triggered by the network, RAN2 needs to discuss how to send the prepared SCG configurations of candidate SNs to the UE, and also needs to discuss how to send the SCG change command to the UE after the MN or source SN decides to change the SCG; RAN3 will also need to discuss new procedures including the preparation and modification of the candidate SN resources, early/late data forwarding. So we suggest to reuse Rel-17 CPC/CPAC mechanisms.

13 – NEC Corporation

Basically, current scope has been derived from the previous long discussions and thus we would like to keep it and not add something more. Otherwise, we will need more TUs or not complete the work on time. From technical aspect, it is not seen as necessary compared to SCG in Rel-18.

14 – ZTE Corporation

There are two aspects:

- Whether this applies only to SCG
- Whether CPC/CPAC framework can be used as baseline

Considering the configuration and maintenance for multiple cell groups will be supported anyway for intra-CU inter-DU L1/L2 mobility, we think actually that the MCG change will already be supported based on objective 1 (at least for the intra-CU case). Then, we think similar signaling framework can also be used for NR-DC with selective activation to support SCG change at least for the intra-CU case. We think this is the typical case for FR2 (i.e. the intra-CU mobility).

Actually, from our point of view, it will be quite strange if we restrict the applicability of such framework only to MCG change but not for SCG change.

Therefore, we think it is too early to take the CPC/CPAC framework as baseline for NR-DC with selective activation, and we propose to keep it open and do the down selection in WI phase with better understanding on the framework of intra-CU inter-DU L1/L2 mobility

In addition, we understand there is some overlap between NR-DC with selective activation and L1/L2 mobility for intra-CU inter-DU case. Considering the limited time in RAN plenary and since the details need WG input, we prefer to leave the detail discussion on framework in WI phase for the two cases. However, if companies want to merge the two cases into one objective, then we prefer to include both cases in MR-DC with selective activation (i.e. objective 1 focus on cell level switching, and objective 2 focus on cell group level switching) based on the following consideration:

- Different from intra-DU L1/L2 mobility, inter-DU mobility will require MAC reset/RLC reestablishment and PDCP recovery, thus the corresponding procedure for intra-CU inter-DU mobility will be quite similar as the cell group activation/deactivation/switching required for MR-DC with selective activation.

- Considering the L1/L2 reset and F1-U path switching in inter-DU mobility, ping-pong HO has to be avoided, which is also different from intra-DU case, where ping-pong switching seems not a big issue. To avoid the ping-pong HO in inter-DU case, we think similar triggering mechanism as MR-DC with selective activation shall be considered instead of the L1 measurement based triggering.

So, we think the objective should be revised and we think either the revised objective in RP-213009 Or the one in RP-213463 can be used for this.

15 – Guangdong OPPO Mobile Telecom.

We prefer to focus on SCG for selective activation of cell group considering the load of R18 mobility enhancement. And inclusion of MCG and NR-standalone scenario will bring extra complexity, especially for the security issue.

Regarding to the issue on whether UE or network triggers the SCG change, we think current CPC/CPAC mechanism can be reused, i.e. the UE autonomous triggers CPC/CPAC based on configured execution condition.

16 – LG Electronics France

In general, we think the required workload of the objective1 is substantial, and therefore it is very important to keep the scope of other objectives very well-defined and strictly limited.

We think extending the objective to MCG (CHO) is not really essential given that SCG operating on a higher frequency range is more vulnerable and hence considered as a primary focus. So, we think limiting the scope to CPC/CPAC should be fine in this WI. Just in case SCG-related enhancements achieve sufficient progress in Rel-18 and extending the enhancements to MCG turns out to require trivial extra efforts, RAN may be able to consider extending the outcome on the SCG to MCG at that time (e.g. via TEI18 or a slight WID revision) but not earlier than that.

For the TBD part, we think we should take CPC/CPAC as a baseline because a) designing a completely new thing would impose unnecessarily higher load in RAN2 and RAN3, and b) taking CPC/CPAC as baseline does not block any enhancements being considered in practice.

17 – China Mobile Com. Corporation

1. We prefer to limit the scenario to SCG change and are open to extension for MCG and NR SA only if time allows.
2. We found it is useful and flexible to have the NW triggered selective activation based on pre-configured cells. If the cell pre-configuration procedure for UE-triggered solution can be reused to L3 NW-command solution, the workload seems acceptable to us.

18 – Ericsson LM

We see some overlap of this objective and what CHO and L1/L2 mobility can do. We hope to not define two solutions for the same problem to avoid market fragmentation and burden the already heavily loaded WGs. We need to consider the workload in the WGs.

19 – Nokia Corporation

- *Whether you believe that inclusion of MCG and NR-standalone is justified and why. Also please give your view on level of additional workload vs SCG, and relation to Objective 1. RP-213009 argues for such an extension.*

We support the extension of this objective to selective activation/switching of MCG in MR-DC and NR standalone scenario.

Similar to SCG use case, the UE can be at the cell edge where it can switch back and forth among two or three MCGs. This is particularly relevant for FR2 where inter-cell interference may not be that critical (due to analog/hybrid beamforming) and the radio link of the UE is more susceptible to e.g. obstruction and hand blockages. Herein, the UE can switch fast among the cells without the need to re-initialize the CHO preparation which reduces the signalling overhead and improve mobility robustness, i.e., handover can be triggered immediately by the UE without being impaired by the additional delay that is needed to re-prepare the cells.

The extension of the objective to include MCG in standalone NR (and MR-DC) will cause additional workload. However, there are a lot of synergies with the SCG selective activation use case that can be leveraged.

- *Your view and rationale on the remaining "TBD" point, including whether you believe enabling via a network command is justified and why (RP-213009 and RP213221 make different arguments), and usage of Objective 1 functionality for such a network command (RP-213463).*

Triggering the subsequent cell change by the UE based on radio measurements may be enough. However, we are also open also to consider the triggering of the cell change by network signalling in case the reason for triggering is not necessarily radio-driven, e.g., network may consider load in different inter-frequency SCGs for triggering the cell change.

20 – InterDigital France R&D

We think the inclusion of MCG and standalone is justified and we think the should be no/limited workload to have the work extended to MCG. Although a similar framework with objective 1 is possible, we think objective 1 targets L1/L2 mobility, while this objective is an enhancement to L3 mobility, so the solutions are very different. Regarding the TBD point, we should avoid already limiting CPC as the baseline, both to allow NW triggered mobility, but also to consider additional triggers for CHO/CPC that are better applicable to the selective activation scenario (beyond just measurement events).

21 – China Unicom

Network triggered solution seems more flexible and no much workload will be added into the WI if NW-triggered solution and UE-triggered solution reuse some similar mechanism. Thus it's proposed to include both CPAC based solution and NW triggered solution can be supported in the objective.

22 – Futurewei Technologies

We are fine to also cover MCG change in the objective to support uniform FR1 and FR2 deployment. We also think network triggering can be considered as well. Limiting the works to NR-DC provides balance in workload and potential benefits.

2.4 Objectives 3 and 4: CHO enhancements

The following objectives are proposed here:

- 3) *To specify CHO including target MCG and target SCG if it cannot be completed in Rel-17 [RAN3, RAN2]*

4) To specify CHO including target MCG and candidate SCG for CPC/CPAC [RAN3, RAN2]

– CHO including target MCG and target SCG is used as the baseline

Please indicate if you agree/disagree that Objective 3 can be completed within Rel-17, and therefore removed as a Rel-18 objective, proposed in RP-213221.

Please also indicate if you have any comments on Objective 4. *Note that there were no input documents on this.*

Feedback Form 5: Objective 3 and 4 (CHO enhancements) comments

1 – Lenovo (Beijing) Ltd

There are different understanding for 4).

- Understanding#1: no target SCG is configured for CHO. After completing CHO, UE has only MCG. UE starts to evaluate the condition for candidate SCG for CPA . UE performs CPA once CPA condition is met.
- Understanding#2: though no target SN is configured for CHO, UE will keep source SN for the case of CHO including target MCG. That means UE has DC after completing CHO. After completing CHO, UE evaluates condition for candidate SCG for CPC. Once condition is met, UE performs CPC.

If understanding #1 is correct, only CPA configuration is sufficient. If understanding#2 is correct, CPC configuration is sufficient.

Another comment for wording: *CPC/CPAC=>CPA/CPA because CPAC includes CPA and CPC.*

2 – MediaTek Inc.

- We agree that Objective 3 can/should be completed within Rel-17, and therefore removed as a Rel-18 objective.
- The terminology of “candidate” and “target” in Objective 4 may be a bit confusing. Our understanding is that a MCG in conditional reconfiguration should be considered as a “candidate” when configured, and becomes “target” when selected for CHO execution (conditions met). This objective seems about having one candidate MCG and multiple candidate SCGs; it may be rephrased as “To specify CHO including one candidate MCG and multiple candidate SCGs for CPAC”.

3 – Intel Corporation (UK) Ltd

We agree that objective 3 can be completed within Rel-17, and therefore can be removed from the R18 WID.

4 – vivo Mobile Communication Co.

We agree objective 3 could be completed in Rel-17.

5 – China Telecommunications

We agree to remove objective 3 since it can be supported in R17.

6 – Samsung Research America

We would like to keep “if it cannot be ...” since it seems difficult to currently confirm the completion in RAN3 works, e.g. We need discussions about the coordination with the CPAC progress on early data forwarding, F1/E1 impact, and stage-2 for the MN-initiated release of the source SN.

7 – Spreadtrum Communications

We agree to remove objective 3 .

8 – HuaWei Technologies Co.

Proponent, we understand objective 3 can be completed within Rel-17.

9 – NEC Corporation

For Objective 3, it is not wise to discuss assume or not assume it is completed in Rel-17. We should base on what is the fact (later). So far, the current description is what we can do and can be kept.

10 – ZTE Corporation

We also think there is a good chance to complete the objective 3 in Rel-17.

11 – Guangdong OPPO Mobile Telecom.

As RAN3 is expected to complete the work of CHO + MR-DC where the target PCell can provide a CHO configuration consisting of both target MCG and target SCG configuration in Rel-17. It is reasonable to remove objective 3.

12 – New H3C Technologies Co.

We are supportive for removing objective 3.

13 – LG Electronics France

We think Objective 3 should be a Rel-18 objective because we don't think RAN2 will be able to complete it on Rel-17 due to lack of time.

For objective 4, we are fine with the current wording.

14 – China Mobile Com. Corporation

We agree to remove objective 3.

15 – Ericsson LM

We think that objective 3 can be removed as it seems it will be completed in Rel-17. But we can wait with the removal until when Rel-17 has been completed (i.e. in a March or June updated of the WID).

16 – Nokia Corporation

RAN3 is currently working on objective 3 in TEI Rel. 17 and it is very likely that the basic support for this would be completed. However, as long as RAN3 did not complete its work, objective 3 can be kept in the WID description and revisited once RAN3 concludes his work on this objective in TEI Rel. 17.

Objective 4 is a new topic that needs to be addressed in Rel. 18.

<p>17 – InterDigital France R&D</p> <p>We agree that objective 3 will be handled as part of Rel17 and can be removed.</p>
<p>18 – China Unicom</p> <p>We support to remove objective 3.</p>
<p>19 – TURKCELL</p> <p>We agree to remove objective 3.</p>

2.5 Mobility-related FR2-specific CA/DC enhancement (Nokia proposal, RP-212950)

Please provide feedback on the additional proposal below. In order to further focus this proposal, I would like to understand which aspects in particular companies feel need improvement and how. In later phase we will discuss extra workload.

To specify mobility related FR2-specific CA/DC enhancements [RAN2, RAN4]

- *Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]*
- *FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times [RAN4]*

Feedback Form 6: FR2 mobility-related CA/DC enh. comments

<p>1 – Verizon UK Ltd</p> <p>Thanks for adding this topic back. If this is to be dropped, at least it shall be dropped openly.</p>
<p>2 – Spark NZ Ltd</p> <p>Spark NZ</p> <p>we support the proposal in RP-212950 and specifically:</p> <p>To specify mobility related FR2-specific CA/DC enhancements [RAN2, RAN4]</p> <ul style="list-style-type: none"> · Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2] · FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times [RAN4]
<p>3 – KT Corp.</p> <p>Based from our commercial FR2 deployment, this is one of the area where necessary enhancement should be added in Release-18. We support to add Objective as written above.</p>

4 – DOCOMO Communications Lab.

From commercial point of view, we are very interested in the topic which was unfortunately (we hope temporarily) removed by non-technical confusions, if found feasible from workload point of view.

As it addresses SCG/SCell setup, the use case is much more fundamental and wider than other objectives. In recent deployment including FR2, measured addition of the SCG/SCell is getting more important.

5 – SoftBank Corp.

Considering FR2 deployment, it is important to improve FR2 usability and we think it is beneficial approach to reduce FR2 SCell/SCG setup delays. So we support adding this objective in Rel-18 MobEnh scope.

6 – MediaTek Inc.

- For RAN2 procedure part (first sub-bullet of the proposed objective), the Rel-16 early measurement reporting procedure could already report FR2 cells; it is unclear what to be improved in this procedure.
- For RAN4 RRM part (second sub-bullet of the proposed objective), we understand that in FR2, due to measurement delay, good cells found in Idle mode may not be good choices when UE enters connected mode, and thus throughput enhancement is not as good as expected even with EMR. However, it is still unclear to us what UE can do to achieve better early measurements without increasing power consumption. We'd like to see some examples of what can be done, and what the impacts on UE are.

7 – Intel Corporation (UK) Ltd

For “*FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCel- l/SCG cell setup times*” – FR2 RRM enhancements was identified as one of topics in the RAN4 Rel-18 email discussion (RP-212682) with measurement delay reduction listed as one of the topics. It is better to avoid overlapping discussions across different WIs and the proposal can be merged into RAN4 RRM enhancements work.

It is unclear what changes will be for RAN2. RAN2 should only work on it if RAN4 's changes have impact on RAN2.

8 – Nokia Corporation

For Mediatek: As shown in our system level simulations and analyses presented in the June workshop in RWS-210079 and contribution to RAN#94e, the current early measurements, which are based on idle mode measurements reported in connected mode, do not work well for FR2. This means that for FR2 deployments idle mode measurements reported in connected mode may indicate wrong cell to be used for SCell activation. This is due to a fact that radio conditions may change rapidly in FR2 beam based deployments even with low and moderate UE speeds. Therefore, it is important for RAN2 to enhance procedures and criteria to improve FR2 SCell/SCG setup delays and early measurement reporting. It is also important that RAN4 defines the corresponding UE RRM requirements as usual.

For Intel: RAN4 may also define additional UE RRM measurement enhancements. The proposed RAN4 requirements under this item are related to the RAN2 enhancements for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]. And as usual the RAN4 requirements should be in the same WID as the corresponding work in other RAN WGs.

We have updated our contribution in RP-213515 to include additional supporting companies (Source: Nokia, Nokia Shanghai Bell, TELUS, Verizon, Telecom Italia, Telefonica, KT), which propose this work to be included to the Rel-18 Mobility Enhancement work item as already discussed in RAN#93e and in the workshop.

9 – China Telecommunications

We are supportive of FR2-specific enhancements for CA and DC, if time allows, we are fine to study the potential solutions in R18.

10 – vivo Mobile Communication Co.

We are open to study the enhancements for FR2-specific mobility, while the only concern is the limited TU assignment for this project.

Besides, we would like to understand more about the work in RAN2: what kind of procedure and criteria to improve SCell/SCG setup delay or early measurement reporting.

11 – TELECOM ITALIA S.p.A.

As indicated by other operators, we think this is a critical issue in commercial FR2 deployment.

Therefore it should be in the scope and even prioritized with respect to other objectives

12 – Deutsche Telekom AG

We think that FR2 specific mobility enhancements are not relevant in Rel-18 timeframe and should be dropped for workload reasons.

13 – TELEFONICA S.A.

We support FR2-specific enhancements for CA and DC and should be prioritized in Rel-18 Mobility Enhancement work item

14 – NEC Corporation

We are open for this basically but we believe it will require additional TUs if this is to be added. Since the total TUs cannot grow, this may be a problem.

15 – ZTE Corporation

In general we agree with the motivation of this objective.

However, without the necessary feedback from RAN4 upfront, it is a bit unclear what enhancement can be pursued for RAN2 related procedures or criteria. If the main intention is to reduce the RRM evaluation time for FR2 cells in EMR, then we think it can also be merged to RAN4 RRM enhancement. In any case, the work should first be done in RAN4 and if there is anything needed from RAN2, this work can be triggered by RAN4 based on an LS.

So, in case majority view is to include this objective, we should at least make it clear that RAN4 is the leading group for this.

16 – Telia Company AB

We see that FR2 mobility related CA/DC enhancements proposed by Nokia in RP-212950 are important for high performing commercial deployments in the future network roll-outs and crucial especially taking into account Release 18 timeframe and the needed capacity from FR2 layer.

17 – HuaWei Technologies Co.

We are not sure the exact impacts on RAN2 specification, since we understand RAN2 has specified the procedure for the early measurement configuration and reporting. If the motivation is to specify additional RRM requirement in order to reduce the measurement delay for FR2, this seems more suitable to be discussed together with other RAN4 FR2 RRM enhancements.

18 – Verizon UK Ltd

Agree with many operators above - this is one of the most practical scenarios where obviously the performance is lacking and 3gpp has not taken it seriously. As Nokia showed, things like early measurement report may functionally work on paper but not in real world. I think if 3gpp wants to spend a little effort study, working on this is far more meaningful and efficient than many other studies on futuristic/academic/-less practical items because this is mostly a mobile network operators' issue, not WIFI users' issue, and it can only be addressed by 3gpp, while items in many other R18 studies will benefit from the research and study of all industries and institutes in the world.

19 – New H3C Technologies Co.

The impact on RAN2 specification on *FR2-specific CA/DC enhancements* isn't clear to us. we hope proponent to clarify it. In addition, it is better for RAN4 to lead this objective if majority views support it.

20 – LG Electronics France

We think these FR2-specific enhancements are something to be considered but it is not crystal clear what enhancements related to EMR are intended with this objective. Hence, if anything related to this objective is attempted, it should clarify its justification and enhancements in more detail. On the TU side, however, we think the current draft TU budget for this WI cannot accommodate these enhancements. One potential placeholder for this enhancement would be CA/(DC) enhancement WI, which then adds RAN2 TU budget for CA/(DC) enhancement WI.

21 – TELENOR ASA

We think this is critical for commercial FR2 deployment and support the proposal.

22 – China Mobile Com. Corporation

We agree with the intention of this objective and prefer to have a more detailed manifestation.

23 – Nokia Corporation

We have provided further details including solutions examples for the RAN2 and RAN4 objectives.

Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]

One way we think would be beneficial is to reuse the EMR framework in NR Rel-16, but with the additional measurements during connection setup in order to ensure higher UE measurement accuracy for FR2 deployments. The UE indicates to the network the availability of measurements during connection setup/resume which can assist the network in (MR)-DC setup and configuration.

FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times [RAN4]

In addition to the fact that for FR2 the current EMR i.e. idle mode measurements reported in connected mode do not work for FR2 like discussed in our contributions and earlier comments, also the current FR2 UE RRM requirements are very relaxed, which may lead to a situation that the UE indicates outdated measurements to the network that are no longer useful for FR2 SCell/SCG setup. Therefore, it is important to ensure that RAN defines suitable requirements for the enhanced RAN2 procedures and criteria. However, considering how relaxed the current FR2 UE RRM requirements are it is rather unrealistic to assume that FR2 UE RRM requirements can be improved to the same level as FR1 requirements. The work item should focus on

FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times. General FR2 UE RRM requirements enhancements can be then done in a separate RAN4-led item, which is common practice for other topics as well.

24 – Ericsson LM

We would be OK with this objective it is limited to **only** RAN4 work. We do not think we should (or need to) change RAN2 procedures to improve FR2 mobility.

25 – China Unicom

The motivation of the objective seems attractive. We are open to discuss this if time allows.

26 – TURKCELL

We support FR2-specific CA/DC enhancement. It's critical for commercial FR2 deployment.

2.6 RACH-less handover (Apple proposal, RP-213374/RP-213375)

Please provide feedback on the additional proposal below, including views on the relationship/independence with/from Objective 1, and amount of extra work.

To specify mechanism and procedure for mobility latency reduction which does not require the support of MIMO or DC.

- *Configuration and operation of LTE-like MBB and RACH-less handover [RAN2, RAN1]*

Feedback Form 7: RACH-less handover comments

1 – Apple Computer Trading Co. Ltd

We support the LTE-like RACH-less and MBB handover scheme, since it is simple and easily implemented by the UE for HO interruption time reduction.

The terminal forms supported by the market and standards are becoming increasingly diversified. so the R18 mobility enhancement should bring the benefit to the different UE types. The WI scope should cover the enhancements not only for the powerful UEs who are equipped equipped with the MIMO or CA/DC capability, but also the simple solutions (e.g. RACH-less, MBB) for the low-end UEs.

2 – KDDI Corporation

we support this proposal.

3 – MediaTek Inc.

- **Make-before-break (MBB):** In LTE, MBB means that after handover command, UE continues communication with source cell until some point before sending preamble. In intra-cell L1/L2 mobility, after TCI state indication, UE continues using old TCI state before switching to new TCI state. Inter-cell L1/L2 mobility is expected to inherit such make-before-break characteristics. However, there may be some requirements (e.g., extra hardware or protocol stack) for UE to prepare for target cell while communicating with source cell. We can discuss the requirements in Objective 1, and then apply them to MBB in L3 handover.
- **RACH-less:** This can be discussed together with TA management in Objective 1.

4 – Intel Corporation (UK) Ltd

The additional gain is unclear compared with existing dedicated PRACH resource/2-step RACH, in addition we will have ways that further reduce the latency in Rel-18, i.e. L1/L2 mobility and MR-DC with selective activation of Cell groups, therefore we do not see the need to consider this in Rel-18 .

5 – vivo Mobile Communication Co.

We are not sure whether this is needed if L1/L2 based inter-cell mobility has been specified, as there may be less benefit on top of L1/L2 based mobility.

Apple made a very good comment that these simple solutions could be used for low-end UEs. Thus, we should firstly identify in which use case that low end devices have requirement on interruption time.

6 – Samsung Research America

It would be still useful to provide higher performance to low-cost NR UEs. We would like to point out that we have developed the Redcap UEs, and MBB and RACHless are beneficial to such UEs.

Furthermore, LTE MBB and RACHless are good baselines, and the additional workload would be trivial.

7 – Guangdong OPPO Mobile Telecom.

We agree RACH-less HO is beneficial for latency reduction during HO, while L1/L2 mobility can also reach similar goal. Considering the workload of R18 mobility enhancement, we prefer to postpone the study of RACH-less HO to later release.

8 – NEC Corporation

We think this should not be added in Rel-18 scope, as current scope is already well justified and wide enough.

9 – ZTE Corporation

We support the MBB+RACH-less since it can provide a good balance between performance and complexity. In addition, we notice the RACH-less is also proposed in NTN WID, it is important to avoid parallel discussions on this in both Wis, so, it should be clarified which WI will actually be responsible for this work.

10 – HuaWei Technologies Co.

As indicated in the objective 1, it is applicable to both FR1 and FR2, which can be regarded as a generic approach to address the mobility latency. Hence we don't see a need to introduce another approach also serving for the similar purpose in the same release, as we heavily discussed before.

11 – New H3C Technologies Co.

Because the objective 1 already considers mobility latency reduction, we aren't sure whether we need introduce additional scheme to address mobility latency issue with consideration of the limited TU and work load.

12 – LG Electronics France

We would like to drop this objective for the following reasons: a) we already have a DAPS solution for interruption reduction at least for FR1, and seeking another solution just for less complexity is not sufficiently justified. b) we do not think mobility optimization for PCell on FR2 is not urgent, and c) the required workload for this objective may not be trivial due to beam considerations. Then, the current TU budget cannot simply accommodate this objective without removing other objectives that are already stable. We do not want to jeopardize the overall stability of the scope of this work item.

13 – China Mobile Com. Corporation

We are open to this if time allows.

14 – Ericsson LM

MBB can be used for scenarios where neither DAPS nor L1/L2-mobility can be used (e.g. for inter-CU and when DAPS is not supported). The RAN2 impact could hopefully be fairly small but RAN4 requirements needs to be specified of course.

RACH-less for NR will be more complex and different than for LTE due to beams. In Rel-16, 2-step CFRA was introduced for handover with the understanding that this would make RACH-less for NR not needed.

15 – Nokia Corporation

We support the objective of reducing the mobility interruption time without requiring MIMO or DC. This is helpful for inter-CU/inter-gNB FR2-FR2 scenarios which is neither addressed by objective 1 nor DAPS (which did not consider FR2-FR2 handover). Moreover, considering that UE vendors are reluctant to implement DAPS, there is need for a simpler method to reduce the interruption time not only in FR2-FR2 scenario but also in FR1.

As for the solutions, we are open to consider the listed options: LTE-like MBB and RACH-less handover. However, we would also like to extend the scope of RACH-less handover to work for other common scenario where the target cell does not necessarily have the timing advance value set to 0 or equal to that of source cell. As discussed in Rel. 16, "Single Active Protocol Stack" handover was proposed as enhancement to LTE RACH-less where the UE acquires the timing advance of the target cell before the

cell change is triggered by the network. This increases the applicability of RACH-less handover to all scenarios including the common scenario where the timing advance of the target cell is different from that of source cell or non-zero. We would like to broaden a bit the scope of the proposed solution to include as well enhancements for LTE RACH-less.

16 – InterDigital France R&D

We agree with the reasoning of the apple proposals, in that the enhancements in the current WID target only UEs supporting MIMO and DC. We would be fine with addition of work on MBB and RACH-less to target UEs with limited capabilities, as long as we agree LTE is used as a baseline, and there is very limited deviation from that baseline (in order to avoid a significant increase in the workload).

17 – China Unicom

We are fine with RACH-less if time allows.

18 – TURKCELL

We are supportive of this objective.

19 – VODAFONE Group Plc

We support the proposal from Apple.

20 – Facebook

We support the proposals.

21 – Futurewei Technologies

As L1/L2 mobility and quick activation of selective CG can already address latency and signaling overhead issue, it is not clear that additional options of MBB and RACH-less would bring more incremental benefits. Given the workload of Rel-18 and limited use scenarios of MBB and RACH-less approaches, we don't think they should be added in Rel-18 scope.

2.7 Summary of initial phase

Justification section:

- No issues so far. Update based on agreements.
- Modifying CPAC to SCG change proposed and seems reasonable, as there are still discussions about whether to use CPAC or not as baseline.

Moderator proposes: Continue based on minor updates in next round.

Objective 1:

- First 2 sub-objectives can be considered stable.
- L1 enhancements proposal to clarify scope:

- Companies felt that current objective was clear enough, and clear that there would be no overlap between RAN1 and RAN2.
 - Regarding TA for unsynchronized, different views on whether this would be based on higher layer approach or lower layer approach. Also some companies want to discuss TA mgmt. for synchronous cases.
- **Moderator proposes:**
- Discuss further the TA management for synchronized cases.
 - Clarify that the TA discussion can consider higher layer as well as L1 enhancement solutions for asynchronous cases.

Objective 2:

Whether to apply only to SCG or to extend to MCG.

- Network command approach seems to be less clear, and concerns about specifying duplicated features raised.
- A number more companies were against inclusion of MCG than supporting it.

Moderator proposes: Maintain the current scope for Objective 2. Not include MCG.

– CPAC used as baseline or not:

- Majority wanted CPAC as baseline.
- Different views on whether to apply a NW command. Use case was mainly for inter-CU and load balancing.
- **Moderator proposes:** Use CPAC as baseline. Downscope the L3 network command approach.

Objective 3:

- Different views on whether it will be completed or not in Rel-17.
- **Moderator proposes:** Leave in Rel-18 WID for now, and we revise the WID later based on Rel-17 progress.

Objective 4: No real issues, but should discuss further some minor wording clarifications.

Moderator proposes: Discuss further minor wording updates.

CA/DC for FR2 mobility:

- Many operators supporting efforts to improve the indicated scenario by the proponent.
- RAN2 and RAN4 RRM objectives proposed.
 - More clarity would be useful on the expected RAN2 impacts, as unclear what they are.
- **Moderator proposes**: Discuss further. Suggest that RAN4 would need to lead and start any work.

LTE-like MBB and RACH-less handover:

- Support for this for inter-CU scenarios at least, and for cases where MIMO is not used.
- **Moderator proposes**: Discuss further whether this can be part of Objective 1, and identify if we can easily apply some aspects to L3-based mobility without really increasing the workload.

RAN4 requirements:

- These need to be added more clearly (core and performance). RRM core requirements and a performance part need further discussion.
- **Moderator proposes**: Further discuss on RAN4 objective formulation.

3 Intermediate Phase

4 Final Phase

5 Conclusion